SHOUT
SHARE
IT

EXPERIMENT STATION LIBRARY

Class 639.73

Number N53

Volume 3 cop 2

Source Binding

Received July 1909

Cost

Accession No. 15435

Bulletin 110 March, 1904

NEW HAMPSHIRE COLLEGE
Agricultural Experiment Station

# EXPERIMENTS IN ORCHARD MANAGEMENT IN NEW ENGLAND

*Peppers in Peach Orchard (College).*

BY F. WM. RANE

NEW HAMPSHIRE COLLEGE
OF
AGRICULTURE AND THE MECHANIC ARTS
DURHAM

NEW HAMPSHIRE COLLEGE

OF

AGRICULTURE AND THE MECHANIC ARTS

# AGRICULTURAL EXPERIMENT STATION

DURHAM, N. H.

## BOARD OF CONTROL

HON. JOHN G. TALLANT, *Chairman*, Pembroke.
HON. GEORGE A. WASON, New Boston.
CHARLES W. STONE, A. M., *Secretary*, East Andover.
HON. WARREN BROWN, Hampton Falls.
PRES. WILLIAM D. GIBBS, *ex-officio*, Durham.

## STATION COUNCIL

WILLIAM D. GIBBS, M. S., *Director*.
FRED W. MORSE, M. S., *Chemist* and *Vice-Director*.
CLARENCE M. WEED, D. Sc., *Entomologist*.
FRANK WILLIAM RANE, B. AG., M. S., *Horticulturist*.
FREDERICK W. TAYLOR, B. S., *Agriculturist*.
EDWARD L. SHAW, B. S., *Associate Agriculturist*.
IVAN C. WELD, *Dairy Manufactures*.

### ASSISTANTS

HAROLD H. SCUDDER, B. S., *Assistant Chemist*.
HARRY F. HALL, *Assistant in Horticulture*.
JOHN C. BRIDWELL, B. S., *Assistant Entomologist*.
EDITH M. DAVIS, *Purchasing Agent*.
MABEL E. TOWNSHEND, A. B., *Stenographer*.

# ORCHARD MANAGEMENT.

F. WM. RANE.

We must learn and realize that the plant has life and appreciates good care and food for best results, like the animal. When neglected it may not disturb us like the squealing of the pig or the kicking and pawing of the hungry horse; nevertheless, its usefulness for best results is impaired and the conditions that might bring success are impossible.

With comparatively few exceptions our fruit trees are very indifferently cared for. Considering their commercial importance they are one of our great sources of income. If we can get so large returns for so little effort what may be expected when we exert ourselves to do more for plants? An equal amount of capital invested, care, labor and attention given it, the average orchard crop will be productive of greater returns than the same expenditure devoted to live stock in New England. This statement is not made to disparage the live stock industry, but to emphasize what may be expected in orcharding.

The varieties of fruits are discussed in Bulletin No. 105, New Hampshire College Experiment Station, and will not be considered at this time. With varieties selected, soil and location determined, and the trees set in well-prepared soil we now are ready to consider their care. This subject will be considered under the following heads:


(1) *Tillage.* Page 89
(2) *Plant Food* (Fertilizers). " 93
(3) *Training the Trees.* " 95
(4) *Pruning.* " 96
(5) *Thinning.* " 97
(6) *Spraying.* " 97
(a) For Insects. " 99
(b) For Fungous Diseases. " 99
(7) *Winter Protection.* " 103
(8) *Picking the Fruit.* " 103
(9) *How to Keep Up Interest.* " 104
(10) *Partial Summary.* " 105

FIG. 2. Renovating an old orchard (College). A crop of Dwarf Peas. The vines are plowed under after the pods are harvested.

## (1) Tillage.

The object of the orchard in the first place is to produce fruit. If we are to expect tree growth when the tree is young and a sustaining productive growth when mature, we must render the conditions favorable for such results. Just how much and often cultivation is needed, and the best means of obtaining it, kinds of implements to use, etc., are open questions. Results are what we are after. If one person can demonstrate that his orchard is more productive than others, we should look into his method of tillage and satisfy ourselves how closely it can be applied to our conditions. The nature of the soil is of great importance in considering this question. Our soil may require constant cultivation or tillage in order to get desirable tree growth; while another with comparatively little attention may be very responsive. As a rule, however, it is an exceptional orchard that gives satisfactory results without receiving occasional tillage. Some lands, in fact many in New England, are too rolling for continuous tillage. This would result in the washing or gullying out of the land and the loss of our best surface soils, which should be prevented. Where the land is level this is another matter and can be practised. On lands only moderately rolling and on others where only certain portions are liable to wash, a crop of some kind could be sown, known as a cover crop, which answers well in keeping the soil from washing throughout the fall and winter. On rolling land washing can largely be prevented by cultivating the soil crosswise, with the contour of the hill. Where the wash is liable to be heavy even if this is done, if a plowed furrow is run along the contour several rods apart, the distance depending upon the steepness of the slope, this will largely overcome the trouble. The benefits from cultivation will usually be large. A prominent pomologist has written: "If tillage and timely effort are good for corn, and peach trees, and blackberries, they ought also to be good for apple trees."

This whole subject of tillage, as I look at it, is to be settled by one's good judgment. In order to have good judgment we must first study the problems themselves. In the first place, orchards need attention for results. The question of tillage can be overdone as well as neglected. There is such a thing as rushing tree growth. Too frequent tillage and carrying it too late into the season are possible errors. There is little use of check-

ing the enthusiasm over more tillage here in New England, as *the land knows* it will be years before we get enough of it; but there are instances where people have in the past been so zealous over the subject that their results were mainly experiences of what not to do. The tree should make its largest and best growth during the early or fore part of the season. If we continue our cultivation until late in the season and at frequent intervals, as in the spring, the trees will not have ripened their wood or had time to prepare themselves for living through our severe winters. It is as important that we check the results of tillage, therefore, at this season of the year, as it was to utilize

Fig. 3. Bush beans in a young orchard. Experiment Station Grounds.

it in the spring. At the last cultivation, therefore, which is usually at the height of the maximum growth near midsummer, we sow some crop in the orchard. This crop will prevent the soil from washing, mulch the ground and hence protect the roots in winter, check excessive growth, mature the wood and when plowed under, give plant food and humus to the soil.

Cover crops are of two kinds, those which have the power of taking nitrogen from the air, called leguminous crops, and those that do not. To the first class belong the beans, peas, clovers, and vetch. To the latter class belong cereals or grains, among them being oats, rye, corn, buckwheat, etc. While the cereals are not as valuable from the standpoint of plant food

they do, however, hold the snow in winter and by rotting on the ground, or plowing under, they improve the physical condition of the soil. Too much nitrogen in an orchard is considered detrimental, as it gives growth instead of fruitfulness. Young orchards need plenty of growth, and leguminous crops are valuable for growing in them.

Our method of renovating old orchards, resulting from experiments, has been to break up the soil in the spring, and then after preparing it well, plant dwarf peas or bush beans in rows. This allows frequent cultivation, and the pods pay well for the labor. When the crops are picked the vines are plowed under, and the land is sown to some cover crop. These come off early so that the cover crop has time to get well established. This same treatment can again be followed the next year, or until the orchard is in good condition. Photographs shown in figures 2 and 3 illustrate this method.

### The Hitchings Method. (Mulching System.)

In discussing methods of tillage we desire to call attention to the care of orchards, particularly the apple orchard, by the above-named method. The writer visited the estates of the late Mr. W. H. White, at Pittsfield and Gilmanton, where about ten thousand (10,000) apple trees have been set during the past two seasons. Mr. White spent some time looking into the business of apple growing, and not only visited the various fruit sections of the country, especially western New York, but engaged many noted growers to come to his farms to suggest methods of handling his orchards. He became deeply interested in Mr. Hitchings of western New York, whose system of orchard culture has of late years received much attention. After visiting the Hitchings orchards and having Mr. Hitchings come to New Hampshire to examine his soils personally, Mr. White became convinced that this was the system best adapted to New England.

This system is carried out as follows: The land for orchards is selected as usual, and the trees are mulched with the grass or vegetation that is cut in the orchard. Beginning when the trees are young by mulching only as far as the root growth naturally extends, and increasing the radius as the tree grows larger, in this way the soil has nothing taken from it other than tree growth, as the vegetation decays and remains above the

Fig. 4. Clean culture in the plum orchard (College). Seeded down with crimson clover at last cultivation.

tree roots. The expense of cultivation, which is the heaviest outlay under the clean culture method, is eliminated. One person can cut the hay and mulch the trees at little expense, while to cultivate the orchard at frequent intervals throughout the growing season is quite an outlay.

The good effects from cover crops in preventing washing or gullying out of the soils, etc., already discussed, apply with equal force here. The young orchards set by Mr. White withstood the very severe dry season of last year as well as any cultivated orchard. Trees set on land that had not been cultivated for many years and simply fertilized with ashes and mulched, made growths of from nine to twelve inches. I am not prepared to say that the Hitchings method is the one to follow, but it does seem to have many advantages that look reasonable if judiciously handled. It is, at least, worthy of further consideration. If it proves to be practical, it is likely to revolutionize our whole idea of apple growing in New England.

The writer in concluding this discussion of tillage, desires to emphasize the remark made at the beginning:—the object of the orchard is to produce fruit.

### (2) Plant Food (*Fertilizers*).

No prescription can be written for feeding all fruit trees, as there are so many varying conditions. About all that can be done is to review the subject, in order that the reader may comprehend the main principles and thereby mould them into their practical application. The feeding of plants is not unlike the feeding of animals. We do not feed horses and swine on the same diet; each is known to do best under its own particular treatment. We must first become acquainted with the plants we are to feed, and when their habits and needs are understood, any one with good judgment can husband them. A good florist understands his plants and knows their wants; a good fruit grower needs a similar knowledge of the plants he is to depend upon for success.

To feed fruit trees intelligently we must ascertain what the soil in which they are growing is capable of doing for them, and if it needs assistance, supply it. The three elements liable to be deficient are potash, phosphoric acid, and nitrogen. If the trees are making rapid growth, have deep green foliage and

mature their wood, we may reasonably infer that their needs are satisfied. If, however, they begin to show sluggish growth, and the foliage turns yellowish, we may infer that they are receiving insufficient food. If the soil is not mellow and friable, it should be made so. A coarse and lumpy soil can be improved by growing some rank-growing cover crop, as cowpeas or rye, or by the use of farm manures, plowing them under in spring. When working about the trees in spring a few handfuls of ground bone and wood ashes spread about the roots and worked in with a hand implement will prove beneficial. It often happens that orchards upon reaching bearing age are growing too rapidly, and show little inclination to fruit. This is largely the case when too much nitrogen is present. This condition can be checked by allowing the orchard a rest for a season without cultivation, or if cultivated, use non-nitrogenous cover crops and apply fertilizers containing potash and phosphoric acid only. These latter ingredients are heavily drawn on when the trees begin to bear. It is estimated that an average crop of apples removes eleven pounds of nitrogen, nearly one pound of phosphoric acid, and sixteen pounds of potash per acre.

Commercial fertilizers are commonly used for bearing orchards. When used in rich soil the results are quite marked, but when applied to young trees in comparatively poor soil, they are not as valuable of good barnyard manures. No rule can be given for the proper application of fertilizers per acre for successful orcharding. Every soil is necessarily different from every other as regards physical, mechanical, and chemical properties. From a study of the soil in question it is thought that with the aid of the following tables one can judge from previous experience as to what should be considered a liberal application.[1]

APPLE.

| | |
|---|---|
| For Nitrogen. | (1) 50 to 100 lbs. nitrate of soda; or<br>(2) 40 to 80 lbs. sulphate of ammonia; or<br>(3) 80 to 160 lbs. dried blood. |
| Available Phosphoric Acid. | (1) 300 to 600 lbs. bone-meal; or<br>(2) 200 to 400 lbs. dissolved bone-meal or bone [black; or<br>(3) 250 to 500 lbs. dissolved rock. |

[1] The New York Agr. Expt. Station. Bulletin No. 94. New Series.

Potash.
(1) 100 to 200 lbs. muriate; or
(2) 100 to 200 lbs. sulphate; or
(3) 400 to 800 lbs. kainit; or
(4) 1000 to 2000 lbs. wood ashes.

For pounds of different materials per tree, divide each by 50, and sow it broadcast under each.

Practically the same amount of fertilizer is recommended for the pear and quince as for the apple. The stone fruits, as cherries, plums, peaches, etc., are given a little heavier dressing of nitrogen and phosphoric acid, but not quite so much potash. Grapes require the same as apples; only about 20 lbs. less of potash per acre. Small fruits, as currants, gooseberries, and raspberries require about the same as grapes, but more nitrogen.

Too much nitrogen is to be avoided, as the tendency will be to run to growth rather than fruit. The potash may be applied in the fall, also one-half the phosporic acid; but the remainder should be applied in spring. Potash is generally considered the most important constituent, since fruits withdraw much larger quantities of it than the nitrogen or phosphoric acid.

### (3) Training the Trees.

Whether to start the limbs high or low on fruit trees depends upon the kind of fruit under consideration, and even different varieties of the same kinds. Some varieties have natural drooping habits, and will require higher trunks than others which grow more erect. The Burbank plum, for example, has a very umbrella-like top, and when laden with fruit bends to the ground, and hence needs a comparatively long trunk. Many other varieties of plums have a naturally upright growth, and it is an advantage to start the head rather low. With apple trees four to five feet is considered about right, depending again upon the character of the variety. Peaches are headed comparatively low,—from twelve to eighteen inches at setting. It is more difficult to work the soil about low-headed trees, and it is thought that the circulation of air is checked, thus favoring fungous diseases as well. High heading also has its faults, in that the fruit is not so easily harvested; the trees are more likely to break down; the damage from windfalls is greater, and the expense in pruning and spraying is larger. It is advisable to visit orchards and get ideas of this question before pur-

chasing one's trees. If we have in mind the form and shape desired and start with the right kind of a tree, it is a simple matter to form the head as desired.

### (4) Pruning.

The only intelligent way to get at this subject is to begin with the young tree the first year it is set, and then each season thereafter cut out the branches not needed. This work is probably most easily done during the dormant season. Where this is done each season no large limbs that are not needed will get in, and only an occasional broken or dead limb of any size will be taken out. Summer pruning, or the rubbing off or destroying of buds that come out on the trunk or branches of vigorous trees, should be practised. The time to do this is before their leaves are fully expanded. Before attempting this, however, one must familiarize himself as to which are superfluous shoots and fruit spurs. Fruit spurs are rubbed off only when one desires to thin the fruit. Shoots that are inclined to go beyond the line of symmetry should be pinched. Summer pruning is not practised as much as it might be to advantage. It is limited to rubbing off and pinching in, but will greatly eliminate the labor of annual pruning if done properly.

Pruning properly done will encourage the normal development of the fruiting habit. It favors branching, and it is a common observation that trees diverted by branching are the ones most likely to form flower buds. The upright or vertical shoots should, generally speaking, be discouraged. When sufficiently thinned, leaving an open and at the same time well-formed tree, we can expect results, other things being equal.

Pruning is a remedy to overbearing, and hence is expected to approximate annual bearing. Spasmodic and overpruning will unbalance the tree, and is likely to do more harm than good. Going into an old orchard and cutting out fire wood is not pruning as we should know it. The trees should never have been allowed to have reached the stage where this is made necessary. Where these conditions do exist much good can be accomplished in renovating a portion of the numerous limbs each year. Where limbs are not over an inch in diameter, as should be the case in annual pruning, they will quickly heal over or doctor themselves. The cut should be made close to the base, so that no stub shall remain. On large limbs, of

course, it is quite another question, and cutting off at right angles will leave far less exposure and give less chances for decay.

### (5) Thinning Fruit.

The practice of thinning fruit is continually growing in favor with our best growers of orchard or tree fruits. By picking off a portion of the fruit when immature, that remaining grows to a larger size. The resulting crop may not necessarily be larger in bulk, but the product will be much superior. Thinned fruit is usually all first grade. Where thinning is practised, the exhaustive results coming from over-cropping are lessened, and hence annual bearing is favored.

Some varieties have the tendency to overbear and thinning regulates this. Always remove the inferior specimens leaving the better ones. It is good practice to wait until the damages from the most troublesome insect pests have appeared, as the plum curculio, codling moth, etc. Then those affected are taken first. Peaches and plums are always thinned for best results, but the thinning of apples is not so commonly practised, and the results to come from it will depend upon varying conditions. From experience I should defer thinning apples until they are the size of a walnut (hickory nut), for the apple has a tendency to thin itself up until about this size. It costs to thin fruit, but the resulting fruit is of a superior grade, and the expense of picking inferior fruit is eliminated at harvesting time. Do not neglect this part of fruit growing.

### (6) Spraying Orchards.

The spraying of fruit trees for both insects and fungous diseases is being better understood and more commonly practised each year. Every one should learn to distinguish the difference between spraying to destroy insects and spraying to prevent fungous diseases. The Bordeaux mixture serves to check fungous diseases, while the other sprays mentioned herewith are used for destroying insects. They are applied together when both insects and fungi are prevalent.

There are many good spray pumps on the market, and the only precaution is, do not make the mistake of getting one too small to do effective work. Generally speaking, get one of the kinds that have force enough to throw a good strong stream to the top of a large tree from a wagon. These are usually mounted on a barrel. See photograph.

Fig. 5. Spraying the orchard. A practical equipment for the average orchard. The men can change about in their work.

The following calendar briefly states what mixtures to use and when to apply them:

| Name of Plant and Insects or Fungi. | Various Applications of Spraying Solutions. | | | |
|---|---|---|---|---|
| | First Spraying. | Second Spraying. | Third Spraying. | Fourth Spraying. |
| *Apple.* Codling Moth, Canker Worm, Bud Moth, Apple Scab. | When buds are swelling apply Bordeaux. | Before blossoms open, Bordeaux. Add Paris Green or Arsenate of Lead for Canker Worm or Bud Moth. | When blossoms have fallen, Bordeaux and Paris Green, or Arsenate of Lead. | Twelve days later, Bordeaux and Paris Green, or Arsenate of Lead. |
| *Pear.* Codling Moth, Leaf Blight, Scab, and Psylla. | Before buds swell, Bordeaux. | Before blossoms open, Bordeaux. Kerosene if Psylla is present. | After blossoms fall, Bordeaux and Paris Green or Arsenate of Lead. | Fourteen days later, Bordeaux and Paris Green or Arsenate of Lead. |
| *Plum.* Curculio, Rot, Aphis, and Scale. | Just before buds open, Bordeaux and Paris Green or Arsenate of Lead. | After blossoms fall, Bordeaux and Paris Green or Arsenate of Lead. | Twelve days later, Bordeaux and Paris Green or Arsenate of Lead. | Kerosene when Aphis or Scale is present. |
| *Cherry.* Rot and Aphis. | Just before buds open, Bordeaux. Kerosene, when Aphis is present. | When fruit has set, Bordeaux. | Twelve days later, Bordeaux if signs of rot are present. | Kerosene if Aphis is present. |
| *Peach.* Rot, Mildew, and Curculio. | As buds are swelling, Bordeaux. | Before blossoms open, Bordeaux and Paris Green or Arsenate of Lead. | After blossoms have fallen, Bordeaux and Paris Green or Arsenate of Lead. | Two weeks later, Bordeaux and Paris Green. |
| *Grape.* Rot and other Fungous Diseases, Flea-Beetle, and Thrips. | When buds begin to swell, Bordeaux. Paris Green or Arsenate of Lead for Flea-Beetles. | As buds are opening, Bordeaux. | Two weeks later, Bordeaux. | Two weeks later, Bordeaux. |
| *Currant.* Leaf Spot, Plant Bug, Worm. | Bordeaux as buds are unfolding. Kerosene. White Hellebore when worms first appear. | Spot, two to three weeks later Bordeaux. Repeat for worms three to four days later. | Spot, two weeks later. Same. Repeat for currant worms. | Spot, two or three weeks later. |
| *Gooseberry.* Leaf Spot, Mildew, Worm. | Same as for currants. Mildew, use Bordeaux or Potassium Sulfid Solution. | Same as for currants. | Same as for currants. Pot. Sulfid two weeks later. | Same as for currants. |
| *Raspberry and Blackberry.* Anthracnose, Saw Fly. | Before leaves open, Bordeaux. Saw Fly as for Currant Worm. | Bordeaux, when six inches high. Same as for currants. | Bordeaux one week later. | |

*More detailed information*[1] can be had for these and other depredations, not named, by sending to this station. By sending specimen of injuries it helps to identify them.

*Borers:* All tree fruits are affected with borers. The best remedy is to go over and examine the base of the trees in spring and fall, and dig them out, if present. Do not let them get established.

*Apple Maggot* (Railroad Worm): Keep pigs or other stock in the orchard so as to eat the fallen fruit.

*Fire Blight:* Cut off and burn at once all affected limbs.

*Black Knot:* Cut off and burn knots as soon as they appear. Spray with Bordeaux.

*Orange Rust:* Dig out and burn affected raspberry and blackberry bushes at once.

## Directions for Making the Bordeaux Mixture, and Principal Insecticides.

*The Bordeaux mixture* is the principal fungicide. Its use will prevent scab, rot, mildew, and other plant diseases. Its regular application will insure a healthy, vigorous plant growth and will produce more and better fruit. See Spraying Calendar above for time of application.

*Formula for Making:* Copper sulphate, six pounds; fresh lime, four pounds; water to make fifty gallons.

Fill a barrel about one-half full of water. Place the copper sulphate in a coarse cheese-cloth bag, and suspend in the water near the surface, where it will dissolve in a short time. In another barrel place unslaked lime and add a small amount of water. As the lime becomes slaked, add more water from time to time and stir well. Then add the copper sulphate solution to the lime water, and the mixture is ready for use. Do not pour the lime water into the copper solution, but the latter into the former. Strain the lime water before using. Never use the lime water while hot. When spraying on a large scale, slake a quantity of lime, as it will keep indefinitely under water. Dissolve the copper sulphate as directed, and add sufficient lime water for each barrel of mixture as prepared. To determine when enough lime water has been added, use a few drops of Ferrocyanide Test. If it quickly changes color, add more

[1] There are numerous bulletins already published by N. H. C. Experiment Station on various insects and fungous depredations.

lime water. When enough lime water has been used the test will not change color.

To prepare *Ferrocyanide Test*, dissolve one ounce of ferrocyanide of potassium (yellow prussiate of potash) in five ounces of water. Bottle for use.

*Paris Green* is an excellent insecticide for the destruction of insects that eat foliage. Its use for the destruction of the potato beetle is familiar. It should be used in the proportion of one pound of the green to two hundred gallons of water, or a teaspoonful of the green to a bucket of water. The green should be first made into a thick paste with a little water before

FIG. 6. The Knapsack Sprayer. A practical sprayer for small fruits, shrubs, vegetables, etc., on a limited area.

being added to the full amount of water. Lime water added to the solution will prevent damage to foliage and also make the mixture adhere.

*Arsenate of Lead* as an insecticide has been proven a great success.

*Formula:* Dissolve in one gallon of water eleven ounces acetate of lead (sugar of lead); in another vessel dissolve four ounces arsenate of soda in half a gallon of water; pour the arsenate solution into the lead solution, stir, and add to fifty gallons of water. Hot water dissolves the chemicals more rapidly and completely, and wooden pails should be used. The solutions

when united form a fine white precipitate, which remains for a long time in solution.

*Green Arsenoid and Paragreen* are cheaper than Paris Green. They do not settle so quickly, and are fully as destructive to insects.

*Much time will be saved* by combining the Bordeaux mixture and the insecticides, in spraying fruit trees for insect pests and fungous diseases in one application. Use same quantity of each as though spraying separately.

*Kerosene Emulsion.* Dissolve one-half pound of hard soap in one gallon boiling water, add one gallon kerosene, churn with spray pump five to ten minutes. Dilute with five to twenty parts of water before using. Kills by contact only.

*Hellebore.* Apply dry or in water at the rate of one ounce in three gallons.

*Potassium Sulfid Solution:* Potassium sulfid (Liver of Sulphur) one ounce, water three to four gallons. This solution will not remain unchanged. The potassium sulfid must be kept in a well-stoppered bottle.

*The Lime, Sulphur, and Salt Solution* is the invariable remedy for the San Jose scale in California and much of the Pacific coast, and wherever the weather conditions happen to be favorable, duplicating, in a measure, the conditions on the Pacific coast, this wash is effective in the East also. It has the advantage of leaving a limy coating on the trees, which acts as a deterrent to the young scale lice, and where it is not washed by rains, retains its value as an insecticide coating for some time, remaining in evidence on the trees for several months.

*Formula:*

| | |
|---|---|
| Unslaked Lime | 30 pounds. |
| Flour of Sulphur | 20 pounds. |
| Common Salt | 15 pounds. |
| Water to make | 60 gallons. |

Take ten pounds of lime and twenty pounds of sulphur and boil thoroughly in twenty gallons of water for an hour and a half. When the solution assumes an amber color it is an indication that the sulphur is all dissolved. The remainder of the lime, twenty pounds, should be slaked thoroughly by pouring hot water over it, adding fifteen pounds of salt while it is still boiling. Stir until salt is all dissolved. The lime and salt material should then be added to the lime and sulphur material,

and thoroughly stirred together a half hour longer. Add enough water to make sixty gallons.

### (7) Winter Protection.

The best and first thing is to select hardy varieties for northern conditions. Stop cultivation early so that the trees will have sufficient time to fully mature before severe winter weather sets in. A cover crop sown at last cultivation assists in maturing the wood early by withdrawing moisture from the trees, and it keeps the soil from washing. Trees planted on well-drained soils are not as liable to heave out in winter. A slight rounding up of the soil about the tree will carry away the surface water and obviate any danger from water standing about the trunk. This is particularly true with young trees. A wire screen of small mesh placed about young trees to the height of eighteen inches will lessen the danger from mice in winter. A common practice is to tramp the snow down about the trees after each heavy storm. This renders the conditions unfavorable for the mice to attack the trees from below. Trees need protection in winter until they are of fairly good size. One example was called to my attention where mice fairly destroyed a young and thrifty apple orchard that had come well into bearing. Rabbits are equally troublesome at times, and they should be fed, destroyed, or have the trees protected against them.

### (8) Picking the Fruit.

In order to work to advantage, picking conveniences should be devised. Where trees are not over fifteen feet high, a step ladder made of three legs, hinged at the top, and of light but durable construction, and hence easily portable, is invaluable. It is equally useful in thinning fruit. For taller trees light ladders running to a point at the top are convenient, as they can be easily placed against branches and in the exact places desired. For very tall trees extension ladders are to be preferred. When a tree is well pruned, a picker can usually get through it, and pick a large portion of the crop by standing upon the branches. A light and nimble person is to be preferred for the outer limbs, and if he wears tennis or rubber-soled shoes the injury will not be so great to the tree.

Each kind of fruit requires very careful and painstaking hand-

ling to keep well. So important do cold-storage men regard this that they prefer to purchase the fruit on the trees and import their own help that they may feel sure the fruit is to be handled right. This is true of apples. If it is true with them, it is vastly more important that peaches, plums, and the other more delicate fruits be given equal consideration. Many patent picking devices have been placed upon the market, but other than to pick the stray apple or fruit out of reach they are of little value.

Fruit growers are following the practice more and more of lessening the time between picking and getting the fruit on the market. If apples are to go into cold storage,[1] they are picked and shipped at once, as in this way the decaying germs do not have time to get established. Peaches that go direct to the market and are sold in their fresh condition are what people want. Grapes, well ripened and freshly picked from the vines, are far superior to those shipped from long distances, and can always be made to command the market, if well grown.

Methods of packing might be discussed, but hardly come under the head of care of the orchard. Suffice it to say that thoughtfulness and neatness in tastefully packing fruit meet with success in proportion to the result attained.

### (9) How to Keep up Interest.

There is little use in trying to do anything in orcharding unless the person engaging in it has well matured and definite ideas of what is necessary for success. Anyone can get enthusiastic over luscious fruits even from seeing them well illustrated in the average trade catalogue, and especially so when successful growers relate their experience and show what the possibilities are. To succeed in fruit growing requires a sufficient study of fruit problems to at least comprehend what the essentials for success are for the crops to be grown. Bulletin No. 105 of this Station, "Fruit Growing with a Selected List of Varieties for New Hampshire," together with this bulletin, should give one a comprehensive idea of what the requirements for success are. If these ideas are supplemented by other reading of which there is any quantity to be had, one's interest can be kept up, provided one has the instincts for success to begin with. We must not look only at the commercial side either, for while this is

[1] See Bulletin, No. 93, "Cold Storage of Apples," N. H. Expt. Station.

commendable and essential, that person who takes genuine enjoyment and pleasure in fruit growing will be the more likely to succeed. One can often learn more in a day by visiting markets, other growers, or by attending fruit meetings, by making a trip to the State Experiment Station, by attending a short lecture course at the State Agricultural College, etc., than he would get by years of studying out the problems by himself. It is a similar example to that of the man whom it took thirty years to make his standard of butter, and then it fell short of the product taught to be made at a dairy school which took but a few weeks.

Orchard management is a problem of its own, and if intelligence, thought, and systematic work be given it, few industries can surpass it for a successful occupation.

## Partial Summary.

(1) Fruit trees have life the same as animals, and they require feeding, watering, and care, if we expect to derive profit from them.

(2) The object of the orchard is to produce fruit. The amount and kind of tillage will vary according to conditions, soil, plant food, etc. Study out the individual needs of each orchard. See page 89.

(3) The experiments carried on at this Station of using dwarf peas and beans as a cultivated crop in orchards, and then turning under the vines after picking the pods, were successful. The orchard has the benefit of continuous cultivation at the proper season, the plants when plowed under enrich the soil, and the picked product pays the bills. See page 91.

(4) The Hitchings Method of culture is worthy of our attention. While not sufficiently tested in New England it appears to have merit.

(5) Fruit trees of different kinds, as apples, plums, grapes, etc., need food according to their respective wants. We do not feed horses and swine on the same diet; why should we different kinds of plants? See page 93.

(6) Whether to train the tree high or low depends upon several conditions. See page 95.

(7) To prune a tree properly means to begin when young and prune annually. This done there is no occasion for cutting off large limbs, which endanger the life of trees.

(8) It costs to thin fruit, but the resulting fruit is of a superior grade, and the expense of picking inferior fruit is eliminated at harvesting time. Peaches and plums are always thinned for best results.

(9) Spraying for both insect enemies and fungous diseases is a part of the fruit business. If one does not intend to post himself on how to combat these foes, he had better not attempt fruit growing. See pages 97 to 102.

(10) Hardy varieties, well-drained soils, and slightly rounding up of the soil about the trees, together with a cover crop, assist very much to protect the trees in winter. See page 103.

(11) Modern conveniences should be devised for picking the fruit. Fruit growers realize more and more the importance of lessening the time between picking and getting the fruit on the market. Apples for cold storage are picked and shipped at once. See page 103.

(12) To keep up an interest in fruit growing requires a sufficient study of fruit problems to at least comprehend what the essentials for success are, for the crops to be grown. Supplement one's work with reading from the best authorities, visiting successful orchardists, attending horticultural meetings and taking a short lecture course at the Agricultural College, etc. Become a fruit grower both in theory and practice.

639.73 N53 3 cop. 2
N. H. Exp. Sta.
Buls. 97-129
1903-1907.

639.73
N53
v.3 cop 2